## Art. IV.—*Experimental Inquiry into the correctness of M. Poiseuille's explanation of the purgative action of certain substances.* By Geo. Wymberley Jones, M. D., of Ga. (Extracted from an inaugural dissertation for the degree of M. D., in the University of Pennsylvania.)

M. Poiseuille declares, that when animal tissues are interposed between the serum of the blood and solutions of sulphate of soda and chloride of sodium, endosmose takes place from the serum to the saline solution. The inference drawn from this is, that the action of purgative salts upon the stomach and bowels of a living being, is a physical one; that, in short, the catharsis produced by these medicines, is nothing more than an endosmose of the serum of the blood, through the coats of the containing vessels to the saline solution within the intestine.

But the most remarkable of Poiseuille's assertions is, that he has discovered that the hydrochlorate of morphia exercises a peculiar influence over the direction of the current. He says that when it was added to the saline solution, the endosmose from the serum to the solution was considerably diminished, and its direction finally reversed.

Attracted by the novelty and interest of these announcements, I determined to try a series of experiments, with a view to ascertain how far the operation of all the cathartics was influenced, or might be explained by this endosmose; and to discover whether the action of the astringents would correspond with the requirements of the theory.

Accordingly, I caused four instruments to be made, after the fashion of Dutrochet's simple endosmometer: and as they were all exactly similar to each other, a description of one will suffice.

It consisted of a glass tube, one-seventh of an inch in diameter, and five inches in length, attached to a scale, which was graduated to the twelfths of an inch: its lower end expanded into a cup-shaped cavity, projected beyond the extremity of the scale; and the rim of the cup, instead of terminating in an edge, was rolled upwards externally so as to form a good place of attachment for the ligature, which bound the membrane, and thus to guard securely against the escape of the liquid within the tube.

In every case, the serum of the human blood was the liquid placed inside of the tube; in every case, a fresh gastric mucous membrane was the one employed; and in every case, the membrane was so arranged, that it should present to the external liquid the same surface with which that liquid would have been in contact had it been taken into the stomach of the living animal. In this manner, the surface of the mucous membrane, which, in the natural state, is next to the tunica propria, was always in contact with the serum; and the surface which usually faces the cavity of the stomach was always exposed to the external liquid.

The first thing to be done was, to verify Poiseuille's first experiment, and this was effected without any difficulty. Upon placing an endosmometer, containing serum, and covered at the bulb by a portion of the fresh gastric mucous membrane of a hog, in a solution of sulphate of soda,—endosmose took place from the serum to the solution: and the same thing happened when common salt was substituted for the sulphate of soda.

It then occurred to me, that a good test for the truth of Poiseuille's theory would be to try the effect of the astringent salts upon the direction of the current.

For if, according to his notion, the purgative salts operate by causing the endosmotic current to flow in one direction, the astringent salts ought to cause it to flow in exactly the opposite one.

Indeed, it is evident, that unless these two classes of medicines produce different directions of the current, the action of neither of them can be accounted for by endosmose; and Poiseuille's theory must be deemed untenable.

I therefore introduced other endosmometers, prepared as before, one into a solution of alum, and a second into a solution of acetate of lead. In both instances endosmose occurred *from the serum to the solution*, in the same direction as when sulphate of soda was used, but with somewhat less rapidity.

But it is my misfortune to disagree with M. Poiseuille on a still more important point; and that is the influence exercised by morphia, when added to a saline solution, in retarding and reversing the current. He used the hydrochlorate of morphia, but I preferred the sulphate, as being most commonly used in medicine.

I placed an endosmometer, prepared as before, in a solution of sulphate of soda; and when the usual action was fully established, added some of the sulphate of morphia. Finding no effect produced I added more—and more again, without causing the slightest diminution in the rapidity of the endosmose from the serum.

I will confess to considerable disappointment at the issue of this experiment. I felt anxious to verify that of Poiseuille: but all my endeavours to do so were of no avail. The morphia was obstinate and would not be persuaded.

But in order to ascertain the influence of morphia upon the direction of the current, the sulphate in solution was placed in a vessel by itself, and an endosmometer immersed in it as usual to about one-fourth the length of the instrument. The current flowed *from the serum to the morphia.*

The same effect was produced by the nitrate of potassa. A solution of tannic acid caused a current from the acid to the serum, with a rapidity which was diminished when the solution was made stronger.

When the infusions of black-hellebore, jalap, and colocynth, were employed as the external liquids, the results did not correspond with their cathartic action; the same thing was also observed of the solution of elaterium.

When, instead of the gastric mucous membrane of the hog, that of a woman, obtained shortly after death, was employed, the results were precisely similar to those already stated.

That there are phenomena occurring in the human body which are properly explicable by endosmose, is undoubtedly true; but that catharsis is one of those phenomena appears to me entirely inadmissible, and I confess my inability to understand how any man could infer that cathartics purged by means of endosmose, from the simple fact of serum permeating a membrane to mingle with sulphate of soda. If there had been no affinity between the liquids, there would have been no endosmose; for we know it to be dependent upon such affinity. Are we then to believe that the action of purgatives is dependent upon their affinity for the blood? And does it follow that because sulphate of soda produces a current from the *serum*, it would therefore produce a current from the *blood?* When, moreover, this latter fluid contains substances, organic and chemical, sufficient to modify and alter any endosmotic action?

How, by this theory, are we to account for the operation of purgatives endermically applied? how for the fact that a drop of croton oil placed on the back part of the tongue will act as a cathartic?

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## Art. V.—*On the use of the Warm and Vapour Baths.* By S. Kneeland, Jr., M. D.—Boston.

In a former number of this Journal, (for July, 1847,) we fully treated the subject of hydrotherapy, in as far as *cold* water forms a part of it: we would now complete the subject, by considering the use of *warm* water and *vapour* in medicine. Though, as we have formerly observed, *cold* water may be employed in many cases where *warm* and *hot* water are commonly considered necessary, still, there are certain diseased conditions, certain idiosyncrasies, where *cold* water will be found less beneficial than *tepid*, *warm* or *hot* water.

*Physiological action of the Warm Bath.*—This may, in a great measure, be inferred from the well-known phenomenon of life during warm weather, depending on increased peripheral circulation—the face becomes injected, as well as the general cutaneous surface; the pulsations of the heart, and the respiration are more frequent; the cutaneous and pulmonary exhalations are increased, and a proportionate increase of aqueous drinks becomes necessary to supply the waste. From this derivation from the internal organs, persons suffering from congestion of these organs find themselves better in summer than in winter.